

the temperature modified by the clearings and burnings of the timber; whilst the lakes and morasses must be much more rapidly silted up by the unusual quantities of mud brought down the rivers, owing to the extensive sluicing of their banks, and the lateral creeks and gullies, in the search for gold.

Sale, 19th November, 1863.

ART. XXVI.—*On Precious Stones.* By REV. JOHN J. BLEASDALE, D.D.

[Abstract of paper, the original read 23rd November, 1863.]

In former years, when the little leisure time at my disposal—seldom more than barely sufficient for necessary recreation—was taken up by some chemical or microscopic investigation, I often wondered that no one undertook to make a collection of, and report upon, the precious stones, (which from time to time were picked up about the gold-fields,) and aid the miners with a few hints as to the stones they should look for, in what place they would be likely to find them, and the probable value attaching to them in their rough state, or in a wrought condition. When once it became known that our mines yielded gems as well as gold, I could not help thinking it a pity that such fine opportunities as were every day afforded of collecting them should be lost, when little more would be required in order to obtain them than a sharp look out when washing for the gold, and occasionally examining the sluices, water-courses, and boxes in which the gravel and sand are agitated and washed. Neither would the additional time and labor needed be of much importance, since being for the most part specifically much heavier than quartz pebbles and sand, they would find a lodgment in such cases not far from the gold. In fact, nearly all the diamonds and sapphires were so found, or picked out of the tin dish in the last operation of clearing the gold. Still, no one came forward, so far as I could learn. Notices of discoveries did appear occasionally in the public papers, but they have always been individual and fragmentary. About a year ago, when my leisure became too little and too interrupted to allow me to look to my laboratory

for relaxation from my serious duties, it occurred to me that I might find a source of reasonable recreation, without much demand on my time, if I took up once more this branch of my early education, whilst at the same time I might hope to contribute my mite towards opening up a probable source of profit to others, by pointing attention to this neglected element of wealth, by eliciting valuable information from others, and by throwing out such practical hints as might occur to me for easily and speedily accomplishing its realisation. To judge from the display of jewels and jewellery in the windows of this city one can have no doubt of the great demand for them; while one regrets that so much of that which is manufactured here should be stuffed with cheap, trumpery stones, and more frequently only paste and imitation stones, notwithstanding that we have both an abundance of fine stones in the country and the requisite means of imparting to them their highest finish in cutting and polishing. In the case before me, I have brought together a somewhat extensive collection of colonial precious stones, some my own, the greater portion kindly lent me by my friends for the purpose of being exhibited this evening. To assist me in the history of some of them, I have invited—and he is here—Mr. Spink, the able lapidary, who cut many of them, and who knows them well; and Mr. Murray, the jeweller of Bourke-street, who has brought the gem of the evening with him. Here they are in goodly array, and for the sake of enabling you to form a juster idea of them, they are placed, as far as may be, side by side with the best specimens I could obtain of stones of the same kind from Ceylon, the East and West Indies, Brazil, and Peru. Here are three diamonds, two from Beechworth and the third from Collingwood Flat. I am enabled, by the kindness of Mr. Crisp, of Queen-street, to exhibit the latter to-night. It was found in the gravel spread on a small garden walk in the lower part of Collingwood, the gravel having been obtained either from Northcote or just above Johnston-street bridge. It is small, but even a small diamond is a great fact. The diamond which Mr. Murray has brought is the largest yet found; it weighed in the rough about three carats; it now weighs a little less than two, and is, as you can all see, a magnificent gem. It was sent to Amsterdam to be cut, and has quite recently been returned to its owner here. Its fair value I take to be from £35 to £40. I may remark that all the Beechworth diamonds that I have seen—about a dozen—were beautifully

distinct in their crystallographic features. With regard to the price of diamonds, I have copied the following from the most recent work I could obtain—*Bristow's Glossary of Mineralogy* (1861)—“Diamonds are weighed in carats ($151\frac{1}{2}$ “of which make one ounce troy) of 3.16 grains each. The “medium value of a diamond when rough is £2, if of one carat “weight; and the value of diamonds of greater weight is “estimated by multiplying the square of their weight in “carats by two, which gives their value in pounds sterling. “Example:—To find the weight of a rough diamond two “carats in weight—the square of the weight $2 \times 2 = 4$; this “multiplied by $2 = 4 \times 2 = £8$, the value of a diamond of “two carats.” “A polished diamond of the purest water, “well cut and free from flaws, is worth £8; above that “weight, the value is calculated by multiplying the square “of the weight in carats by eight. Thus:—The value of a “polished diamond of two carats— $2 \times 2 \times 8 = £32$; the “value of a polished stone of three carats— $3 \times 3 \times 8 = £72$, “and so on.”—*Bristow*, page 110. The following information is taken from the works of Dr. L. Feuchtwanger, New York, 1859:—“Diamonds are found in talcose chlorite schist “and in a breccia, consisting of ferruginous clay, quartz pebbles, sand and oxide of iron fragments; and also in a “secondary bed, accompanied by gold, platinum, topaz, “beryl, tourmaline, kyanite, amatoze, spinelle, corundum, “and garnet. The rocks in which diamonds have been “recently found consist of the itacolumite, a micaceous sandstone, accompanied by mica-schist, accidentally traversed by “quartz veins. The gold, diamonds, and other fine stones “are always imbedded in the lower part of the alluvium.” Speaking of Brazil, he says, “Experience has shown the “richest localities to be in Curranlinho, Datas, Mendanho, “&c., where the alluvial soil is from eight to twenty feet “thick, and is composed almost entirely of silicious sand, “strongly coloured by argillaceous iron, which forms a species “of cement of pebbles of quartz, milky quartz, and itacolumite, which form a coarse pudding stone, called cascalho, “and which is considered by the diamond-washers a sure “sign of the diamond.”—Pp. 188, 189. I travelled last year over a vast area of formations of the above characters. I allude to the district in which the diamonds have been found; it stretches from the foot of the Beechworth hills to Chiltern, and further; and in even more strongly marked features between Chiltern and Rutherglen. The

rubbish thrown out of every hole sunk by the diggers at intervals over that plain was strongly marked with the above-mentioned features. The gravelly hill at Northcote, and the one above Johnston-street bridge—out of which came the small diamond which I exhibit—are not altogether without these characteristics. Mr. Anderson, of the Junction Hotel, Plenty-road, stopped me lately when passing, but before the small diamond was found in Collingwood, to show me quite a quantity of stones—beryls and tourmalines, I think, and others that I have not yet had time to study—which he had picked out of a hill at the back of his house, apparently of the same formation as that at Northcote. Surely it would be interesting if the Government geologists would examine, or cause these formations to be examined. I understood Mr. Anderson, who has had much practical experience in mining both in America and here, to say that he had traced them to the granite hills above the Yan Yean.

CORUNDUM.

SAPPHIRES.—These gems have been found from time to time since the opening of the Ovens gold-fields, and perhaps there more abundantly than elsewhere. I have got them in every shade of blue, from nearly black to the palest blue. Their crystallographic forms are generally exceedingly obscure, fine crystals being very rare. 2. Besides the blue, I can exhibit to-night specimens of the green sapphire—the Oriental emerald—but I have not a fine specimen polished. The one before you is brownish in this light. 3. Star sapphires.—I believe I may claim to have first discovered any specimens of these gems in Victoria. In fact, until I found some among a quantity of matters collected together from diggers, by Mr. Turner, the enthusiastic collector of gems at Beechworth, I was not aware that this stone had been found anywhere out of Ceylon.*

RUBY.—I have seen but one which had been obtained anywhere in Australia, and that was got in Queensland, and cut in Melbourne by Mr. Spink. It turned out to be a star ruby, of good size and great beauty. This stone (producing one) is, I think, new. It belongs to the asterias; but, instead of having a floating star of six rays of white light, it has a fixed star of six black rays in a deep blue ground.

* The crystalline structure of specimen No. 2 from Beechworth is as indisputable as its star is superior to this (No. 3) from Ceylon.

As to the price of sapphires when cut and polished, a good sapphire of ten carats is valued at fifty guineas, and one of twenty carats at 200 guineas. Under ten carats the price may be estimated by multiplying the square of its weight in carats into half a guinea; thus one of four carats would be worth— $4 \times 4 \times 10s. 6d. = \text{£}8\ 8s.$

TOPAZES.—1. White.—These are very abundant at the Ovens and about Dunolly, and in smaller crystal of great beauty from Flinders Island. This very beautiful small specimen is from there, and was cut by Mr. Spink. 2. Blue.—Of these I have seen some very large and exceedingly splendid specimens. 3. Red.—I have seen none of this kind, but they are reported to have been found at Dunolly. All, without exception, were outwardly almost without distinct crystallographic characters. No yellow ones yet have been shown to me.

BERIL.—1. I have seen no true emerald. 2. Aquamarines, I believe, have been found in several places, lately at or near Northcote, but the specimens given to me I have not yet finally examined.

GARNETS, HYACINTHS, AND ZIRCONS.—1. Garnets.—I have seen about half-a-dozen altogether, Almandine tints. Mr. Butters mentioned a fine one found lately just over Prince's Bridge, near the barracks. 2. Hyacinths.—I have several, one of very fine colour. 3. Zircons are very abundant on several of the gold-fields. They have often been mistaken, when small, for rubies. I exhibit the first white Victorian zircon I have seen. It is cut heart shape, and is a superb stone.

OPALS.—District, the Ovens.—1. White and milky, but with a fair share of fire—I have seen in Beechworth some fine specimens, much water-worn and in shape resembling rather long and flat French beans. 2. Fire Opal.—I have seen only one specimen, which was given me by a Beechworth digger. It is a very grand one.

AMETHYSTS.—In great abundance on the Ovens and elsewhere. 1. Yellow, very abundant, and frequently fine, of the Cairngorm variety. 2. Purple, also abundant. 3. White Rock Crystal—This is the stone which so oftens tempts persons with the notion they have discovered a diamond.

JASPARS AND AGATES.—Very abundant on the Ovens, and some of them large, and very beautifully variegated.

With regard to improving and diffusing the knowledge of precious stones among the mining populations, especially in

districts like Beechworth, where so many have been already found, and facilitating the collection of them, I would suggest two things :—First, that the Athenæum or Mechanics' Institution should be provided with a few suitable and secure glass cases, in which the stones found might be placed for a time by their owners for exhibition. The larger the number of each kind that can be got together the better, as then all the different shapes of the crystals, and their shades of colour, can be compared. It is only by getting together quantities of the different species, and showing them in a collected form, that any adequate idea of either the beauty of individual specimens, the abundance of the material, or even the local monetary value of them, can be ascertained. In this way, too, the various crystalline forms of the different classes can be most easily impressed on the mind, and occurring specimens readily recognised in the often hasty operation of washing for gold. In all cases when practicable, cut and polished specimens should be placed along with the rough stones. The importance of this recommendation cannot be exaggerated. Secondly, As to more carefully searching for gems, I would suggest that schoolmasters teaching on places like the Woolshed, for example, should try to interest the children in searching for them in their play hours, and induce them to bring all the smaller crystals, no matter of what colour, that they can find. With very little teaching, they would soon learn to reject the mere worthless quartz crystals, and become expert collectors. Their quick eyes and nimble fingers would enable them to pick up rapidly any crystal of value that was lying exposed on the heaps of tailings or in the sluices. It is certain they would often find stones that would be at once worth a considerable sum of money. As to children's fitness for this work, or amusement, I will make one extract from the writings of the celebrated traveller and trader in gems, Tavernier. The following was witnessed by him, on his visit to the mine of Roolconda:—"A very pretty sight is that presented every morning by the children of the master-miners and of other inhabitants of the district. The boys—the eldest of whom is not over sixteen, or the youngest under ten—assemble and sit under a large tree in the public square of the village. Each has his diamond-weights in a bag, hung on one side of his girdle, and on the other a purse containing sometimes as much as 500 or 600 pagodas. Here they wait for such persons as have diamonds to sell, either from

“the vicinity, or from any other mine. When a diamond is brought to them, it is immediately handed to the eldest boy, who is tacitly acknowledged as the head of this little band. By him it is carefully examined, and then passed to his neighbour, who, having also inspected it, transmits it to the next boy. The stone is thus passed from hand to hand amid unbroken silence, until it returns to the hand of the eldest, who then asks the price, and makes the bargain. If the little man is thought by his comrades to have given too high a price, he must keep the stone on his own account. These children are so perfectly acquainted with the value of all sorts of gems, that if one of them, after buying a stone, is willing to lose one-half per cent. on it, a companion is always ready to take it.”

ART. XXVII.—*On Water Supply and Irrigation.* By
F. C. CHRISTY, Esq., C.E.

[Abstract of paper read 23rd November, 1863.]

The author briefly noted a few of the chief causes of aridity in Victoria during the summer months, and urged such causes as reasons for storing the winter rains.

The average of ten years' rainfall for Victoria is about 28 inches. The average rainfall in Melbourne for six consecutive years from 1840, was 26·679 inches. The average rainfall of England is 26·6 inches.

The following table shows the average for the Spring, Summer, Autumn, and Winter months here and in England.

	Prof. Neumayer's 10 Years' Obs. Inches.	S. Gibbons' 5 Years' Obs. Inches.	Mean of England. Inches.
Spring ...	9·15	9·42	4·929
Summer ...	5·34	4·58	6·927
Autumn ...	7·65	5·68	9·299
Winter ...	7·02	8·26	5·459

The mean evaporation at Melbourne for the three years, 1860, 1861, and 1862, is 44·517 inches.

This amount of evaporation is less felt owing to the greatest rainfall in Victoria occurring during the months of Winter and Spring, when the ground is moderately moist